

11/09/01

PTO-1390 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE 01-07-02		ATTORNEY'S DOCKET NUMBER 460-27 PCT
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <b>10/030523</b>
INTERNATIONAL APPLICATION NO. PCT/DE00/01466	INTERNATIONAL FILING DATE 11.May.2000 (11.05.2000)	PRIORITY DATE CLAIMED 13.May.1999 (13.05.99)
TITLE OF INVENTION <b>HIGH RESOLUTION VIDEO MICROSCOPE FOR MEASURING EXTRACTED SAMPLES OF PARTICLE SUSPENSIONS WITH IMPRESSED SAMPLE OSCILLATION</b>		
APPLICANT(S) FOR DO/EO/US <b>HAJO SUHR</b>		

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
  2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
  3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)).  
The submission must include items (5), (6), (9) and (21) indicated below.
  4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
  5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2)).
    - a. ☒ is attached hereto (required only if not communicated by the International Bureau).
    - b. ☐ has been communicated by the International Bureau
    - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
  6. ☒ An English language translation of the International application as filed (35 U.S.C. 371(c)(2))
    - a. ☒ is attached hereto
    - b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4)
  7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35U.S.C. 371(c)(3))
    - a. ☐ are attached hereto(required only if not communicated by the International Bureau).
    - b. ☐ have been communicated by the International Bureau.
    - c. ☐ have not been made; however the time limit for making such amendments has NOT expired.
    - d. ☐ have not been made and will not be made.
  8. ☐ An English translation of the amendments to the claims under PCT Article 19 (35U.S.C. 371(c)(3)).
  9. ☒ An oath or declaration of the inventor(s) (35U.S.C. 371(c)(4)). (UNSIGNED)
  10. ☐ An English Translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).
- Items 11 to 20 below concern document(s) or information included:
11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
  12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
  13. ☒ A **FIRST** preliminary amendment.
  14. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
  15. ☐ A substitute specification.
  16. ☐ A change of power of attorney and/or address letter.
  17. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13.2 and 35 U.S.C. 1.821-1.825.
  18. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
  19. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
  20. ☐ Other items or information:

I hereby certify that this correspondence is being deposited with the United States Postal Service "EXPRESS MAIL POST OFFICE TO ADDRESSEE" service under 37 C.F.R. on the date indicated below and is addressed to:  
Commissioner of Patents and Trademarks, Washington, D.C. 20231 on November 9, 2001. EXPRESS MAIL

NO. EL117197582/US

By:

Thomas M. Galgano

Date: November 9, 2001

10/030523

PCT/DE00/01466

460-27

## CALCULATIONS PTO USE ONLY

21. ☒ The following fees are submitted:**BASIC NATIONAL FEE (37 CFR 1.492(a) (1)-(5)):**

Neither international preliminary examination fee (37 CFR 1.482)

nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO

and International Search Report not prepared by the EPO or JPO.....\$1000.00

International preliminary examination fee (37 CFR 1.482 not paid to  
USPTO but International Search Report prepared by the EPO or JPO.....\$ 860.00International preliminary examination fee (37 CFR 1.482) paid to USPTO  
but international search fee (37 CFR 1.445(a)(2)) paid to USPTO.....\$ 710.00International preliminary examination fee (37 CFR 1.482) paid to USPTO  
but all claims did not satisfy provisions of PCT Article 33(1)-(4).....\$ 690.00International preliminary examination fee (37 CFR 1.482) paid to USPTO  
and all claims satisfied provisions of PCT Article 33(1)-(4).....\$ 100.00

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☒ 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).

\$130.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	5 - 20 =	0	x \$18.00	\$0.00	
Independent claims	2 - 3 =	0	x \$80.00	\$0.00	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$270.00	\$0.00	
TOTAL OF ABOVE CALCULATIONS =				\$990.00	
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2				\$495.00	
SUBTOTAL =				\$495.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$0.00	
TOTAL NATIONAL FEE =				\$0.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +				\$0.00	
TOTAL FEES ENCLOSED =				\$495.00	
				Amount to be refunded:	\$
				Charged:	\$

- a. ☒ A check in the amount of \$ 495.00 to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \$ \_\_\_\_\_ to cover the above fees.  
A duplicate copy of this sheet is enclosed.
- c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment  
to Deposit Account No. **07-0130**. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card  
information should not be included on this form. Provide credit card information and authorization on PTO-2038.
- NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive  
(37 CFR 1.137 (a) or (b) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

Thomas M. Galgano

REGISTRATION NO. 27,638DATE: November 9, 2001

PATENT

DOCKET NO.: 460-27

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : HAJO SUHR  
PCT NO. : PCT/DE00/01466  
PCT FILED : May 11, 2000  
FOR : HIGH RESOLUTION VIDEO MICROSCOPE FOR  
MEASURING EXTRACTED SAMPLES OF PARTICLE  
SUSPENSIONS WITH IMPRESSED SAMPLE  
OSCILLATION

PRELIMINARY AMENDMENT

Hon. Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

Dear Sir:

Preliminary to the initial Office Action, please amend the above-identified  
application as follows:

IN THE CLAIMS

Cancel claims 1-5 and substitute therefor the following new claims

6. A method for laboratory examination of a sample, extracted from a suspension of emulsion, in a sample holder, which contains a device with which the sample can be artificially agitated, and in which sequences of microscopic images of the agitated sample are recorded with short-time illumination.

7. An apparatus for laboratory examination of a sample, extracted from a suspension of emulsion, in a sample holder, which contains a device with which the sample can be artificially agitated, and with a microscopic image-recording device with short-time illumination, which is suitable for recording sequences of microscopic images of the agitated sample.

8. An apparatus according to claim 7, characterized by the following features:

the microscopic image-recording device is provided with a video microscope for microscopic imaging of particles, especially biological cells in suspension samples or droplets in emulsion samples,

the video microscope is a microscope for high-resolution imaging of rapidly moving microscopic particles by extremely short illumination pulses (about 1 microsecond), especially by pulsed light-emitting diodes,

the sample holder for the suspension can be viewed by the microscope through an optically transparent window,

the suspension layer that is sharply imaged by virtue of the limited depth of focus of imaging with the objective lens comprises a small partial volume of the total suspension preparation,

the suspension can be maintained in agitated flowing condition by magnetomechanical or electromechanical devices, especially magnetic stirrers or piezoelectric oscillators,

the mechanically induced agitation of the suspension generates constant intermixing of the suspension and prevents the formation of particle concentration gradients inside the sample holder ,

the illumination with submicrosecond flashes permits high-resolution imaging of ultra-small particles down to the submicron region,

a plurality of images of the same sample suspension can be recorded by the electronic camera on the microscope and delivered to an automatic image-processing system for counting and characterization of the objects imaged with sufficient sharpness,

the mechanically induced agitation of the suspension ensures rapid complete exchange of the particles between the sharply imaged volume layer and the rest of the suspension in the sample holder,

by virtue of the mechanically induced flow exchange, the individual images contain representative and uncorrelated statistical image data from the suspension and each image therefore contributes proportionally to the set of image data that can be evaluated.

9. An apparatus according to claim 8, characterized by the following features:

a plane transparent cell containing the suspension is held directly under the microscope objective lens on a piezoelectric ring, which can be excited to mechanical vibrations by an external alternating voltage,

the vibration of the piezoelectric crystal is coupled into the cell by means of the mechanical contact, thus leading to constant rapid motion and intermixing of the particles in the suspension,

a rapidly pulsed ( $< 1$  microsecond) light-emitting diode for transmitted-light illumination is disposed under the cell.

10. An apparatus according to claim 8, characterized by the following features:

the sample holder is a vessel which has a capacity in particular of one to ten milliliters and into which there dips a hermetically sealed microscope tube with pulsed LED illumination unit,

at the tube end there is disposed an optical window, through which the microscope views the suspension,

laterally of the tube end there is disposed a pulsed light-emitting diode for oblique illumination of the microscope with transmitted light,

a miniaturized magnetic stirrer is provided for intermixing of the suspension.

REMARKS

By this amendment, Claims 1 - 5 have been replaced with new claims 6 -10 which correspond to the amended claims submitted in the PCT application.

An early and favorable action on the merits of the application is earnestly solicited.

Respectfully submitted,

HAJO SUHR



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F:\public\G&B#1\460\460-27\PRELIM.AMD

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES  
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum  
Internationales Büro



(43) Internationales Veröffentlichungsdatum  
23. November 2000 (23.11.2000)

PCT

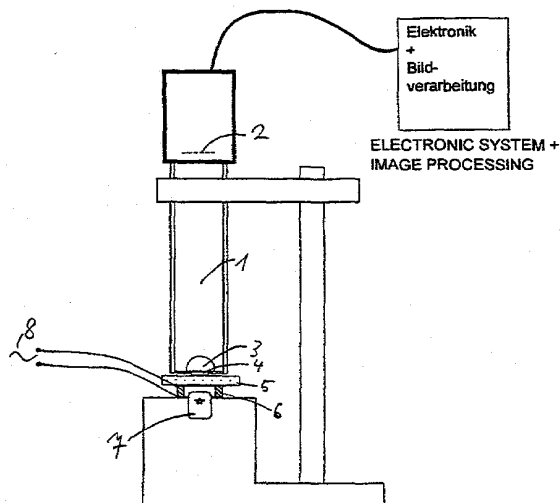
(10) Internationale Veröffentlichungsnummer  
**WO 00/70385 A3**

- (51) Internationale Patentklassifikation<sup>7</sup>: G02B 21/00, 21/26 (72) Erfinder; und  
(75) Erfinder/Anmelder (nur für US): SUHR, Hajo [DE/DE]; Schröderstrasse 33/1, D-69120 Heidelberg (DE).
- (21) Internationales Aktenzeichen: PCT/DE00/01466 (74) Anwalt: MEYER-ROEDERN, Giso; Bergheimer Strasse 10-12, D-69115 Heidelberg (DE).
- (22) Internationales Anmeldedatum: 11. Mai 2000 (11.05.2000) (81) Bestimmungsstaaten (national): JP, US.
- (25) Einreichungssprache: Deutsch (84) Bestimmungsstaaten (regional): europäisches Patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (26) Veröffentlichungssprache: Deutsch
- (30) Angaben zur Priorität: 199 23 074.9 13. Mai 1999 (13.05.1999) DE
- (71) Anmelder (für alle Bestimmungsstaaten mit Ausnahme von US): KARL VÖLKER STIFTUNG AN DER FACH-HOCHSCHULE MANNHEIM [DE/DE]; Windeckstrasse 110, D-68163 Mannheim (DE).
- Veröffentlicht: — Mit internationalem Recherchenbericht.
- (88) Veröffentlichungsdatum des internationalen Recherchenberichts: 19. April 2001

[Fortsetzung auf der nächsten Seite]

(54) Title: HIGH-RESOLUTION VIDEO MICROSCOPE FOR MEASURING EXTRACTED SAMPLES OF PARTICLE SUSPENSIONS, WITH IMPRESSED SAMPLE OSCILLATION

(54) Bezeichnung: HOCHAUFLÖSENDES VIDEOMIKROSKOP ZUR AUSMESSUNG EXTRAHIERTER PROBEN VON PARTIKELSUSPENSIONEN MIT EINGEPRÄGTER MECHANISCHER PROBENSCHWINGUNG



(57) Abstract: A high-resolution video microscope is used to measure extracted samples of particle suspensions. The sample is oscillated and images of said sample are taken using an extremely short exposure time.

(57) Zusammenfassung: Zur Ausmessung extrahierter Proben von Partikelsuspensionen dient ein hochauflösendes Videomikroskop. Die Probe wird in Strömungsunruhe versetzt, und es werden mit extrem kurzer Belichtungszeit Bilder von der Probe aufgenommen.

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- 1 -

High-resolution video microscope for measurement of extracted samples of particle suspensions with imposed mechanical vibration of the samples

### Specification

Instrumental measurement and characterization of particles in sample suspensions of small size represents an important diagnostic method. During preparation of yeast or brewing of beer, for example, suspension samples are taken from the fermentation vessels, diluted, viewed in standardized transparent measurement chambers (such as Thoma measurement chambers) under the laboratory microscope, counted to determine the concentration and measured as regards particle size by means of automatic image processing. This is a standard method in all particle-controlled processes, such as in biotechnology or in chemical process engineering, where substances in the form of microscopic particles are formed in reactors and must be characterized.

In medicine also, blood samples with volumes of milliliters to microliters are taken and evaluated in the same way, if necessary with the help of staining methods.

This invention solves two problems that have occurred heretofore in the diagnosis of small suspension volumes by microscopy.

Firstly: To allow counting in the standardized counting chamber under the laboratory microscope, laborious dilution steps fraught with the potential for error must be performed, until a highly diluted sample suspension suitable for visual or automatic characterization has been prepared in a small sample volume on the micrometer order. Each dilution step and the final transfer into the measurement chamber risks deviations from a correct evaluation. Manual errors, adsorption

effects, osmotic effects, sedimentation and phase-separation effects due to flow accelerations can destroy the representative character of the prepared random sample of particles.

Secondly: The prepared transparent measurement chamber must be fixed and focused in precise and stable manner under the microscope, so that motion blurring due to residual flow or vibrational agitation or optical defocusing cannot interfere with the visual or automatic image evaluation. This places stringent requirements on the microscope stand and on the optical adjusting devices.

Even if the actual image evaluation is automated by digital processing, costly drawbacks still exist in the need for a complex laboratory microscope, for a cell of precise volume and for particularly careful focusing.

Both problems are circumvented by the invention described herein. According to the invention, the sample is kept constantly agitated and in rapid motion by electromechanical or magnetomechanical devices, in an apparent paradox to the requirements of high-resolution microscopy. As a result, the sample suspension is continuously and intimately remixed, and so no concentration gradients can develop.

Since high-resolution microscopic images of the suspension can no longer be obtained with conventional microscopes because of the artificially imposed agitation, there is used according to the invention a high-resolution video microscope with extremely short exposure times of less than one microsecond. This video microscope is prior art in the area of on-line process control (German Patent 4032002 C2 and the article entitled "In situ microscopy for on-line characterization of cell population in bioreactors", Biotechnology & Bioengineering 47, 106-117 (1997)). The extremely short exposure time of this microscope, less than one microsecond, permits sharp photographs of moving microscopic particles in the mechanically

shaken, vibrated or stirred sample cell.

Furthermore, this microscopy concept does not require a mechanically limited, precise observation volume. To the contrary, it is possible to use the virtual volume carved out of a larger suspension environment due to the limited depth of focus of the imaging with the objective lens. The observed measured volume is defined objectively and reproducibly by application of a numerical sharpness criterion in the automatic image processing algorithm. It can be calibrated with a well-defined standard suspension. The rapidly pulsed video microscope produces countable and measurable direct photographs from the sample suspension artificially maintained in turbulent or flowing motion. After calibration, the counted objects can be interpreted directly as a measure of the particle concentration.

A relatively large number of images, amounting to several hundred, for example, are recorded through a transparent cell wall, and are delivered to the automatic image-processing system for counting and measurement of the particle shapes.

To ensure that the intimate mixing of the suspension and also its concentration are maintained even in the presence of the tendency toward phase separation due to sedimentation and adsorption, the suspension is kept in motion by miniaturized mechanical stirrers or by imposed shaking effects produced by magnetomechanical or electromechanical vibrations. For example, a piezoelectric crystal excited to vibrations and maintained in contact with the cell can be used for continuous intimate mixing and movement of the particles. The size of the statistical random sample from which the image information is compiled is proportional to the number of images recorded. This is true, however, only if it is guaranteed that the scenes of successive pictures (or in other words the particle population contained randomly therein) are completely uncorrelated. Thus the sharply imaged virtual sample volume that is used within the suspension for evaluation must

completely exchange its contents between two images. This purpose is also satisfied by the inventive mechanical shaking of the cell.

The following three main advantages are achieved with the microscopic cell agitated according to the invention under a pulsed video microscope:

1. Simple sample holder: There is no need for a sample chamber of precise volume, since in any case only the sharply imaged particles in a small partial volume of the cell are filtered out for evaluation by the image-processing system, thus ensuring a virtual sample volume that can nevertheless be calibrated precisely. The automatic image-processing system counts sharply imaged cells and, with the average counting rate per image, generates a calibratable signal of the numerical concentration in the suspension. In addition, it can discern morphological details such as shape factors or size histograms.
2. Complex focusing capability is unnecessary, because the microscope always finds a sharply imaged layer in the suspension, while layers that are not sharply imaged are screened out of the evaluation by the automatic image-processing system. Thus sharp images of the suspension can be recorded even without complex sample fixation and without a low-vibration microscope stand. Even the low-vibration fixation and immobilization of the preparations under the microscope that are necessary in conventional microscopy can be discarded, since the motion blurring of agitated particles is electronically canceled by the extremely short exposure time. This means that a cost-effective and simple mechanical mount can be used, without the conventional expensive adjustable microscope stand.
3. Simplified sample preparation: The need for high dilution is eliminated or alleviated, since the in situ microscope records

images that can be evaluated and calibrated even in the range of very high concentrations of, for example, greater than  $10^9$  particles of 4 micron particle diameter in one cubic centimeter. If sample volumes of milliliter size are available, there is no longer any need for meticulous preparation of representative minute sample volumes (which are therefore susceptible to error) of a few microliters, since the larger samples with imposed movement of the preparation remain thoroughly intermixed and representative pictures thereof can be produced directly in the pulsed video microscope.

In this way the net effect is achieved that microscopic characterization of particle parameters in small sample volumes can be substantially simplified and made more cost-effective.

Fig. 1 shows a practical example of the inventive device. It comprises microscope tube 1 with image sensor 2 (such as a CCD frame) and with objective lens 3 and viewing window 4 through a transparent sample cell 5 of square construction. The cell is seated on a piezoelectric ring 6, which can be electrically excited to mechanical vibrations by a conventional type of electrode coating. If a suitable electrical alternating voltage 8 is applied to the electrodes, periodic motions ranging as desired from low-frequency to ultrasonic vibrations can be coupled into the cell and induce intimate mixing of the suspension.

A miniaturized flash lamp 7, if necessary with a condensing optical system, is positioned under the cell at the center of the piezoelectric ring in order to generate transmitted-light illumination of the moving samples. The use of pulsed light-emitting diodes is advantageous, because they are cost-effective.

Claims

1. An apparatus including a video microscope for microscopic imaging of particles such as biological cells in suspension samples or droplets in emulsion samples, characterized by the following features:
  - the video microscope is a microscope for high-resolution imaging of rapidly moving microscopic particles by extremely short illumination pulses (about 1 microsecond), for example from pulsed light-emitting diodes,
  - the sample holder for the suspension is viewed by the microscope through an optically transparent window,
  - the suspension layer that is sharply imaged by virtue of the limited depth of focus of imaging with the objective lens comprises a small partial volume of the total suspension preparation,
  - the suspension is maintained in agitated flowing condition by magnetomechanical or electromechanical devices such as magnetic stirrers or piezoelectric oscillators,
  - the mechanically induced agitation of the suspension generates constant intermixing of the suspension and prevents the formation of particle concentration gradients inside the sample holder,
  - the illumination with submicrosecond flashes permits high-resolution imaging of ultra-small particles down to the submicron region,
  - a plurality of images of the same sample suspension is recorded by the electronic camera on the microscope and delivered to an automatic image-processing system for counting and characterization of the objects imaged with sufficient sharpness,
  - the mechanically induced agitation of the suspension ensures rapid complete exchange of the particles between the sharply imaged volume layer and the rest of the suspension in the sample holder,

- by virtue of the mechanically induced flow exchange, the individual images contain representative and uncorrelated statistical image data from the suspension and each image therefore contributes proportionally to the set of image data that can be evaluated.
2. An advantageous embodiment of the apparatus according to claim 1, characterized by the following features:
- a plane transparent cell (5) containing the suspension is held directly under the microscope objective lens (5) on a piezoelectric ring (6), which is excited to mechanical vibrations by an external alternating voltage (8),
  - the vibration of the piezoelectric crystal is coupled into the cell by means of the mechanical contact, thus leading to constant rapid motion and intermixing of the particles in the suspension,
  - a rapidly pulsed ( $< 1$  microsecond) light-emitting diode (7) for transmitted-light illumination is disposed under the cell.
3. An advantageous embodiment of the apparatus according to claim 1 and 2, characterized by the following features:
- as the sample holder (9) there is used a vessel which has a capacity of, for example, one to ten milliliters and into which there dips a hermetically sealed microscope tube (10) with pulsed LED illumination unit (11),
  - at the tube end there is disposed an optical window (12), through which the microscope views the suspension (9),
  - laterally of the tube end there is disposed a pulsed light-emitting diode (11) for oblique illumination of the microscope with transmitted light,
  - the intermixing of the suspension is powered by a miniaturized magnetic stirrer (13).
4. A method for examining a sample, characterized in that the sample is agitated and sequences of microscopic images of the sample are recorded with short-time illumination.
5. An apparatus for performing the method according to claim 4.

Elektronik + ...

= Electronics + image processing

1/2

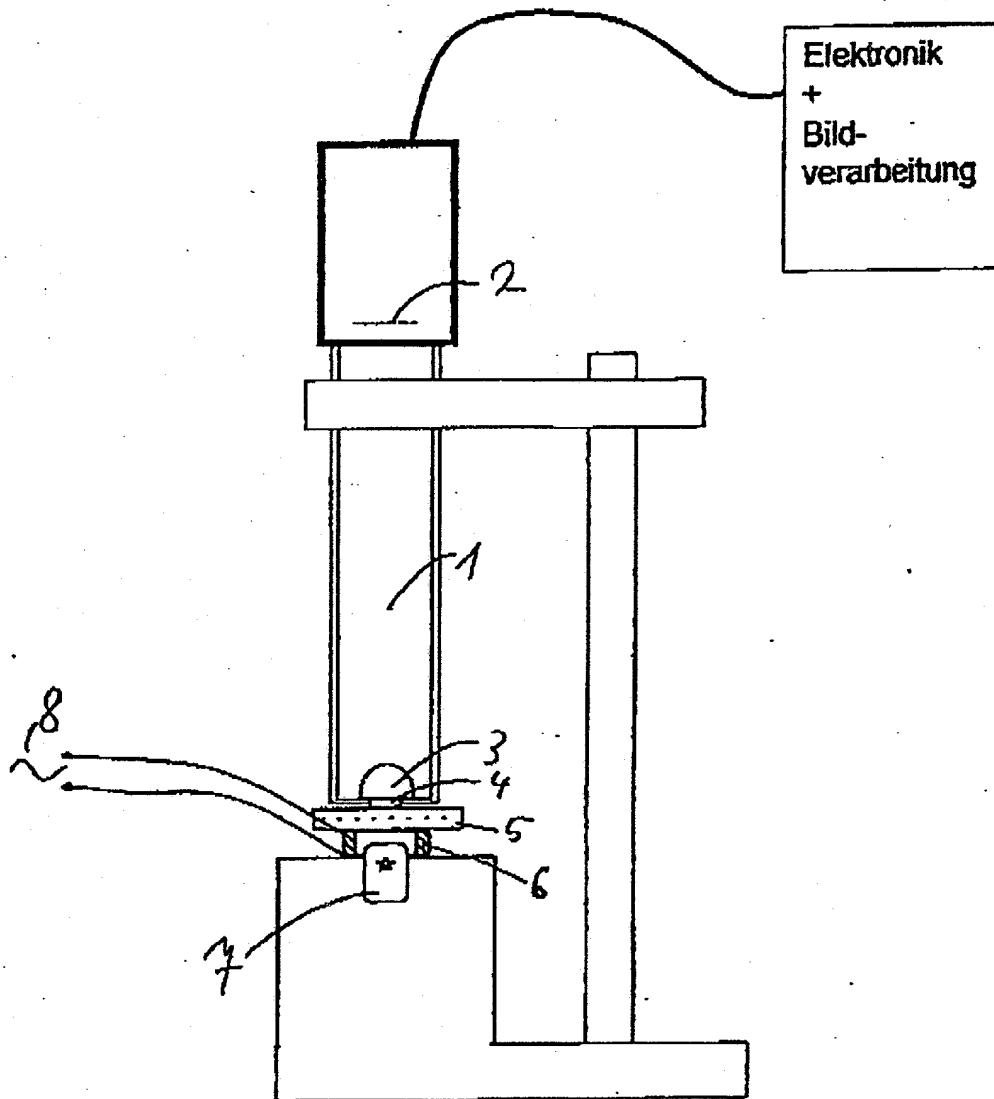


Fig. 1



Elektronik + ...

= Electronics + image processing

Video- ...

= Video camera

2/2

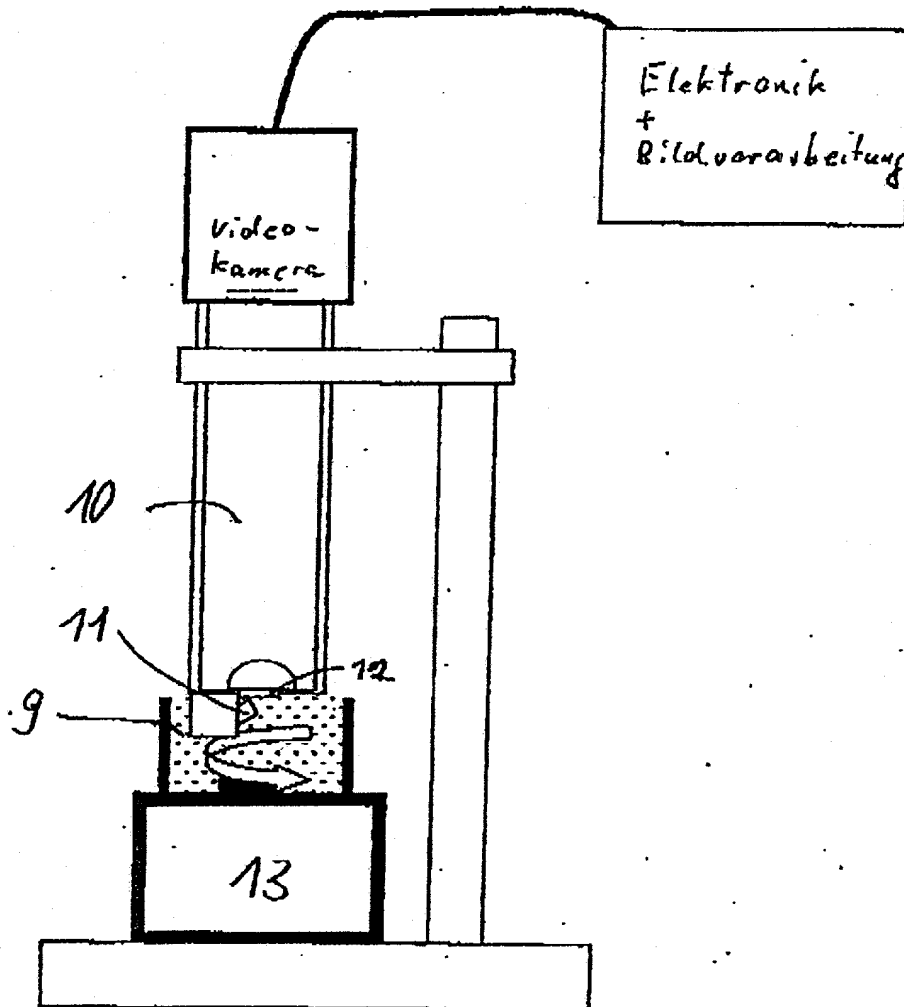


Fig. 2

**COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY**  
 (Includes Reference to PCT International Applications)

ATTORNEY'S DOCKET NUMBER

460-27

As a below named inventor, I hereby declare that:

APR 01 2002

My residence, post office address and citizenship as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

the specification of which (check only one item below):

☒ is attached hereto.

☐ was filed as United States application  
Serial No. \_\_\_\_\_

on \_\_\_\_\_

and was amended

on \_\_\_\_\_ (if applicable).

☒ was filed as PCT international application

Number PCT/DE00/-1466

on May 11, 2000

and was amended under PCT Article 19

on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

**PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:**

COUNTRY (if PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 USC 119
Germany	199 23 074.9	May 13, 1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

**COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY**  
 (Includes Reference to PCT International Applications)

 ATTORNEY'S DOCKET NUMBER  
 460-27

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

**PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:**

U.S. APPLICATIONS			STATUS (Check One)		
U.S. APPLICATION NUMBER	U.S. FILING DATE		PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED (if any)			

**POWER OF ATTORNEY:** As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (List name and registration numbers):

**THOMAS M. GALGANO**, Registration No. 27,638  
**DANIEL P. BURKE**, Registration No. 30,735

Send Correspondence to: Thomas M. Galgano, Esq., Galgano & Burke  
300 Rabro Drive, Suite 135, Hauppauge, New York 11788

Direct Telephone Calls to:  
 (name and telephone number)  
 (631) 582-6161

1	FULL NAME OF INVENTOR	FAMILY NAME <u>SUHR</u>	FIRST GIVEN NAME <u>HAJO</u>	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY <u>D-69120 HEIDELBERG</u>	STATE OR FOREIGN COUNTRY <u>BUNDESREPUBLIK DEUTSCHLAND</u>	COUNTRY OF CITIZENSHIP <u>GERMANY</u>
	POST OFFICE ADDRESS	POST OFFICE ADDRESS <u>SCHRODERSTRASSE 33/1</u>	CITY <u>D-69120 HEIDELBERG</u>	STATE & ZIP CODE/COUNTRY <u>BUNDESREPUBLIK DEUTSCHLAND</u>
2	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
3	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201 <i>Hajo Suhr</i>	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE <u>09. Nov. 2001</u>	DATE	DATE